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STANDARDIZED COTTON TARE IN EGYPT

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PURPOSE OF STUDY

The covering of the American cotton bale is not standardized. Its lack of uniformity and its excessive weight have frequently been pointed out with considerable criticism. Because of irregularity in weight, shipments of American cotton to the mills of this and foreign countries are often subjected to taring to determine the actual weight of coverings. In this process 10 per cent of a shipment is stripped, and the covering is weighed. The cost of this procedure is an unnecessary charge upon the industry and one which could be eliminated if the tare [1] were uniform or if the covering of each bale were of known weight. Moreover, the use of an unnecessarily heavy covering involves needless expense both for the excess material used and for freight charges on the added weight. Because of the possibility of eliminating these charges, and with them the expense and annoyance of making and collecting tare claims, considerable interest has been manifested throughout the industry in improving the American bale.

The merits of the Egyptian bale are recognized throughout the cotton world. It is a model of uniformity in dimensions and in regularity of tare. The marketing of the Egyptian crop is free from the constant challenging and expensive testing for tare to which the American bale is continually subjected. This study of the Egyptian methods of baling and marketing cotton is published in the hope that it will suggest practical methods for improving the American bale.

THE EGYPTIAN BALE

The Egyptian high-density bale (fig. 1) possesses many desirable characteristics. The bale reaches the markets of the world in remarkably good condition. The covering weighs 4 pounds and is

[1] Tare throughout this discussion means the collective weight of covering and bands put on the bale.

bound to the bale with 11 bands. The bale weighs approximately 750 pounds, of which the total tare is 22 pounds, or slightly less than 3 per cent. Principal among its advantages are the following: Uniformity of bale—dimensions, weight, density; completeness of protection afforded the cotton by the covering; regularity of tare; lightness of tare; square heads, or ends, facilitating storage; and general neatness of the package.

UNIFORMITY OF BALE IN DIMENSIONS, WEIGHT, AND DENSITY

The dimensions of the Egyptian high-density bale are standardized at 52 by 22 by 32 inches. Uniformity of length and width is secured by compressing the cotton in boxes of fixed dimensions, closed on all sides. Uniformity of depth or thickness is obtained by locking all bands at a uniform length.

FIG. 1.—The Egyptian high-density bale. Three surfaces are shown: A, Side; B, edge; C, end. The tare on this bale is standardized at 22 pounds

When, in the process of compressing and baling Egyptian cotton, the bands have been applied and securely locked, to prevent slipping, the pressure is released, and the bale expands to the extent allowed by each band, but no more. This use of a locking device to regulate the length of the band and to prevent slipping is in decided contrast to the method of tying bands on compressed cotton usually employed in this country, to which is doubtless due much of the irregularity of depth and shape of the American bale.

Another feature of the Egyptian bale which contributes to the uniformity of its shape and dimensions is the regularity of the spaces between the bands, which are placed approximately 3½ inches apart, with rarely a variation of more than one-fourth inch. This is in marked contrast to the placing of bands on the American bale, on which the spacing of the bands is very irregular. Gaps of 6 or 7 inches between bands are found frequently on American bales, with the result that stress on the bands is unequally distributed, and bulges

in the package may occur. The regularity of spaces between the bands is indicated by the following measurements of the spacing between bands, made on two typical Egyptian bales taken at random:

Bale No. 1	Bale No. 2
Inches	Inches
3¾	3⅝
3½	3½
3¼	3½
3½	3½
3⅝	3¼
3¼	3⅝
3⅝	3½
3⅜	3¼
3½	3⅛
3¼	3⅜

The spaces between the outer edges of the end bands and the ends of the bales measured between 2¼ and 2½ inches.

For comparison of spacing between bands, two high-density American bales were similarly chosen and measured. The widths of the spaces between bands on these two American bales were found to measure as follows:

Bale No. 1	Bale No. 2
Inches	Inches
3¼	2½
7	3
6½	6⅜
7	6½
7	6¼
7¼	10½
7	6½
3¼	3⅜
5¼	2½

The spaces between the outer edges of the end bands and the ends of these bales measured as follows:

Bale No. 1	Bale No. 2
Inches	Inches
3½	4
5¼	2½

The average weight of the Egyptian high-density bale is 750 pounds, and the variation from this weight does not often exceed 50 pounds. (Fig. 2.) The narrow range of variation in these weights bears an important relation to the general desirability of the bale. An analysis of the weights of 2,500 bales was made. Approximately 89 per cent of these bales ranged in weight from 701 to 800 pounds, a variation from the average of not more than 50 pounds. (Table 1.) A similar analysis of the weights of 15,620 American bales, data for which were secured in connection with a former study,[2] showed that only 62 per cent of such bales fell within a like deviation from the average, that is, weighed between 451 and 550 pounds.

[2] BEVERIDGE, E. A. INVESTIGATIONS OF AMERICAN COTTON TARE. U. S. Dept. Agr., Bur. Agr. Econ. Prelim. Rpt. 1925, 17 p. 1925. [Mimeographed.] The weights used were taken at random from information furnished by shippers in the following 6 Cotton Belt States: Georgia, 2,061 bales; Oklahoma, 1,900 bales; Texas, 5,984 bales; Louisiana, 2,333 bales; Mississippi, 2,117 bales; Alabama, 1,225 bales.

TABLE 1.—*Analysis of weights of 2,500 bales of Egyptian cotton*

Range of weight	Bales	Percentage of total	Range of weight	Bales	Percentage of total
Pounds	*Number*	*Per cent*	*Pounds*	*Number*	*Per cent*
551 to 575	5	.20	751 to 775	789	31.56
576 to 600	5	.20	776 to 800	418	16.72
601 to 625	4	.16	801 to 825	75	3.00
626 to 650	24	.96	826 to 850	14	.56
651 to 675	37	1.48	851 to 875	3	.12
676 to 700	110	4.40			
701 to 725	305	12.20	Total	2,500	100.00
726 to 750	711	28.44			

It is worthy of note that the general uniformity in weight of Egyptian bales (Table 1) renders the regularity of depth of bales easy to attain with little variation in density per cubic foot. As is

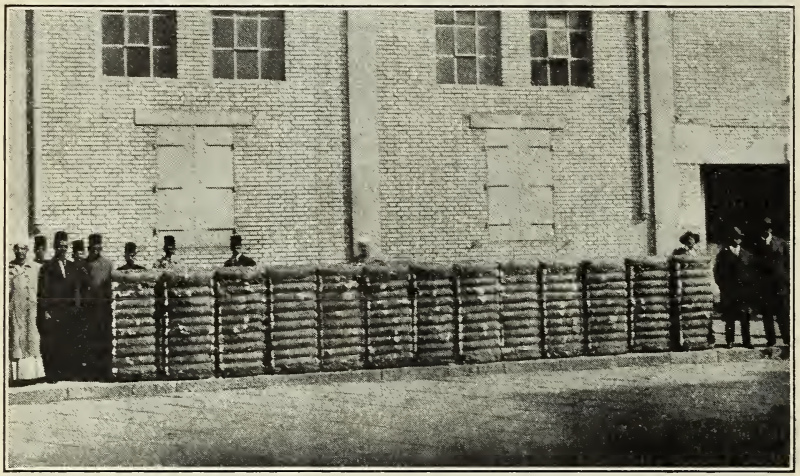

FIG. 2.—Egyptian high-density cotton bales at compress plant, Alexandria, Egypt. Note the uniformity of these bales

shown in Table 2, the bale is usually compressed to a density of about 35.4 pounds per cubic foot, a density slightly greater than that of the usual American high-density bale. Although the use on American cotton of ties which would lock at a fixed length would make possible a bale of standard dimensions, it is probable that greater variations in the weights of individual American bales would result in greater variations of density than occur in the case of Egyptian bales.

TABLE 2.—*Approximate dimensions, weight, and density of the Egyptian high-density bale, the American standard or railroad-compressed bale, and the American high-density bale*

Bale	Dimensions	Weight	Density per cubic foot
	Inches	*Pounds*	*Pounds*
Egyptian high-density	52 by 22 by 32	750	35.4
American standard or railroad-compressed	57 by 30 by 21	500	24.1
American high-density	59 by 24 by 19	500	32.1

COMPLETENESS OF PROTECTION AFFORDED THE COTTON BY THE COVERING

The covering used on the Egyptian bale is cut to pattern from closely woven burlap (fig. 3) and is so applied as to cover the bale completely, leaving none of the cotton exposed. The heads of the bale are covered with pieces of the material cut to the exact size needed and sewed to the burlap covering on the sides, in the middle of the

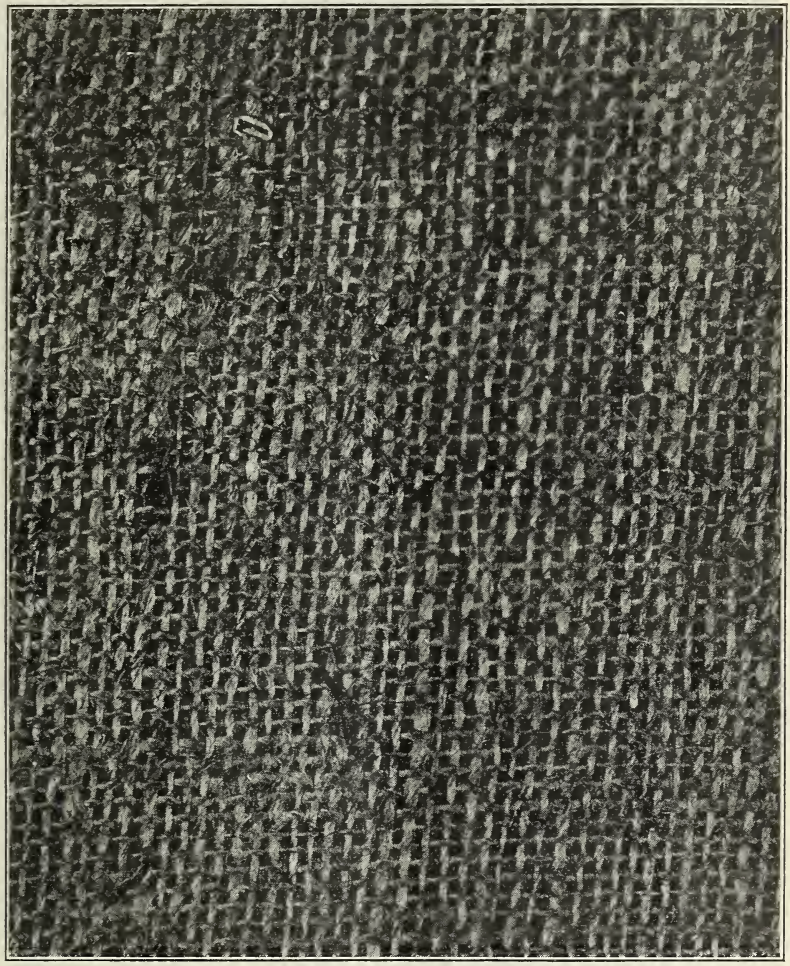

FIG. 3.—Covering used on the Egyptian cotton bale. This bagging is 40 inches wide and weighs 9 ounces to the linear yard

space between the first two bands. About 28 stitches are taken in sewing on each end; medium-weight twine is used for the purpose.

The protective value of the covering is enhanced by the use of 11 bands of uniform length, as previously described. This tends to distribute the pressure evenly and, since the bands are closely spaced, to reduce the stress on the bagging between the bands. The bands themselves offer considerable protection.

Some damage to the bagging naturally results from compressing and from the wear and tear of handling. The burlap on being removed from the bale at port or point of destination frequently shows rents from strain and some damage due to cuts made by bands. This damage, however, is seldom incurred to the extent that either the protection of the cotton or the neatness of the package is seriously impaired.

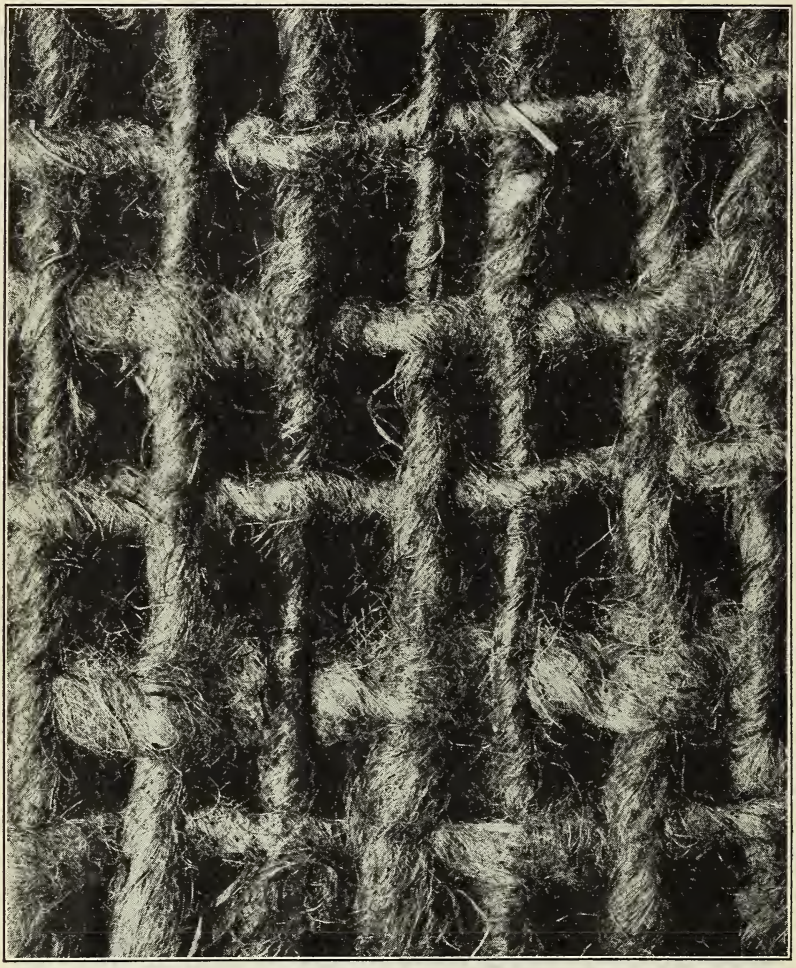

FIG. 4.—Jute bagging commonly used on American-grown cotton. This bagging is 44 to 45 inches wide and weighs 2 pounds to the linear yard

REGULARITY OF TARE

The bagging used on the Egyptian high-density bale weighs approximately 4 pounds. The 11 ties weigh approximately 1⅝ pounds each, or 17⅞ pounds in all. The bale is sold on a tare allowance of 22 pounds per bale, and the total tare so closely approaches this figure and is so regular that it is seldom challenged. This high degree of standardization of tare is of considerable importance in the marketing of the Egyptian crop. It obviates the necessity of taring at port or

point of destination (a process to which the American bale is continually subjected) and the annoyance and expense of tare claims to buyer and seller.

The factors contributing most to regularity of tare are (1) the use of only one weave and weight of bagging cut to an exact pattern and (2) the use of a fixed number of bands of uniform weight. The fact that the bale is not patched is also important, since it obviates the possibility of destroying the uniformity of tare by the addition of patches of varying weight.

LIGHTNESS OF TARE

As against a tare of 26½ pounds allowed the American square bale of 500 pounds in export, the Egyptian high-density bale of 750 pounds carries but 22 pounds tare. Expressed in percentages of the total

FIG. 5.—Egyptian cotton stored in Liverpool. Note the good condition of bale coverings. These bales stand squarely on end. (Photograph by courtesy of Mersey Docks and Harbor Board, Liverpool)

weights of the packages, the American tare is about 5.3 per cent, whereas that of the high-density bale of Egypt is approximately 3 per cent. This feature of the Egyptian bale makes possible considerable economies in freight and other transportation charges.

SQUARE HEADS, OR ENDS, FACILITATING STORAGE

Square heads, which are characteristic of the Egyptian bale, are of definite advantage in stowing and storing. (Figs. 5 and 6.) These advantages are made possible by the Egyptian practice of compressing the cotton into a box that is closed completely at the ends.

GENERAL NEATNESS OF THE PACKAGE

Not the least of the advantages of the Egyptian bale is the general neatness of the package, a feature which, though of no tangible

FIG. 6.—American cotton stored in Liverpool. Ragged condition of bale coverings is especially apparent when compared with the condition of those shown in Figure 5. (Photograph by courtesy of Mersey Docks and Harbor Board, Liverpool)

FIG. 7.—American cotton received at Manchester, England. The appearance of these bales is in sharp contrast to that of the Egyptian bales shown in Figure 8. (Photograph by courtesy of the Manchester Ship Canal Co.)

FIG. 8.—Egyptian high-density cotton received at Manchester, England. This bale carries 11 bands of standardized length. Note the regular spacing between bands. (Photograph by courtesy of the Manchester Ship Canal Co.)

FIG. 9.—American cotton at Liverpool. This is about the usual condition of the American bale on arrival in Europe. (Photograph by courtesy of G. T. Howard, cotton controllers, Liverpool)

economic value in itself, adds to the attractiveness of the bale and to satisfaction in its use. In this respect, the contrast with the American bale is noticeable.

RELATION OF EGYPTIAN MARKETING METHODS TO THE EGYPTIAN BALE

Special merchandising practices in Egypt, which begin with the growing of the cotton and end with the concentration and final baling for shipment of all cotton at a central port, have an important influence on the final form of the bale.

A large part of the cotton crop of Egypt is sold by the growers in crop lots, either before the seed is put in the ground or before the crop has matured. It is customary, however, for some producers to sell cotton in the seed and for others to sell it after it has been ginned and has reached the market in Alexandria. The producer is usually financed through the season by banks which make advances to him as needed, or by merchants who buy cotton in crop lots before it is grown. In some cases, those who grow cotton on a very large scale either gin their own cotton or have it ginned and sell it through the banks or merchants in the Alexandria market. There is nothing in Egypt to parallel the case of the small farmer in this country who sells his cotton on the street as it is ginned. Most Egyptian growers, however, own less than 10 acres of land and have only small quantities of cotton for sale.

MOVEMENT FROM FIELD TO GINNERY

The cotton crop of Egypt is picked by women and children and put into burlap sacks which measure 83 by 45 inches and hold about 400 pounds of unginned cotton. The cotton is then sent either by camel or by light railway to the local village market, where a change of ownership usually takes place. Afterwards, the buyer sends it, still in the same sacks, directly to the ginnery, called in Egypt a "ginning factory," or to the market in a large town in the interior, from which it is taken to a gin.

A modern ginnery located at Kafr el Zayat, on the Nile, is typical. This plant, which contains 120 roller gins, stands in the middle of a large cotton yard piled high with sacks. (Fig. 10.) These sacks contain 400 pounds each of cotton in the seed. They are carried on the backs of burros from the piles in the yard to the automatic conveyor in the ginnery. (Fig. 11.)

GINNING

It is common practice in Egypt to make three distinct ginnings of the cotton. In the first operation the roller gin is used, and the machines are opened wide so as to drop out as much as possible of the imperfect cotton. The second ginning also is performed on a roller gin. For the third ginning a saw gin is used, the outturn of which is very low-grade cotton, valued at about one-fourth the current price of the best cotton.

When the sacks in which the seed cotton has been brought to the gin are emptied, they are cut up and made into coverings for the bale. Three sacks are required to cover each bale, each "pack" weighing 3 pounds. The Hessian cloth from which they are made is 40 inches wide and weighs 9 ounces to the linear yard.

After being ginned, the cotton is pressed into hydraulic, or soft, bales ranging in density from about 9 to 13 pounds per cubic foot.

The weight of this initial bale varies considerably, ranging from 700 pounds upward. Its dimensions are usually either 57 by 45 by 56 inches or 60 by 40 by 56 inches. The bale is bound by four or five bands, each 13 feet 1 inch in length, and of an average weight of 1¾

FIG. 10.—Cotton yard and ginnery at Kafr el Zayat, on the Nile. Sacks of cotton in the seed are often piled high in the cotton yard

pounds. The total amount of tare on the hydraulic, or soft, bale is, therefore, not uniform in weight but averages about 18 pounds per bale. These bales are sent to Alexandria either by rail or by barge. (Fig. 12.)

FIG. 11.—Burros carrying sacks of cotton from yard to ginnery. Sacks contain 400 pounds of cotton in the seed

THE MARKET IN ALEXANDRIA

The warehouses and compression plants at Alexandria constitute an arterial system through which passes the whole of the Egyptian crop. All of the high-density compress plants in Egypt are located

here—9 plants and 20 presses. The output of the 142 ginneries of Egypt thus ultimately passes through the channels of trade in Alexandria.

Cotton that arrives in Alexandria in soft bales is stored in warehouses. When the bales are put on the market for sale, the bagging is cut and one or more bands, as necessary, are removed to facilitate sampling. As a result, these soft bales frequently become ragged in appearance.

The selling of Egyptian cotton in Alexandria involves three examinations of the cotton. At the end of each successive stage the buyer has the right to reduce his offer or to withdraw it altogether. The prospective seller of cotton goes with his samples to the spot bourse, where the buyers are represented. After examining the samples, which are contained in a piece of burlap folded into a bag, and which are piled in a heap and usually represent 25 or 30 bales,

FIG. 12.—The hydraulic, or soft, bale. The bale is here shown in three positions: A, side; B, edge; C, end

the buyer makes an offer. If the offer is accepted, the buyer then sends his own samplers to draw from the bales additional samples, which he staples and examines. Before the transaction is definitely concluded, the bales are given a third thorough sampling and examination.

COMPRESSING AT ALEXANDRIA

When the cotton moves to the compress for shipment, the original bale is opened and an entirely new bale is constructed. The bands which were put on in the original instance are removed and returned to the ginning plants. The bagging or burlap which originally covered the soft bale is again used at the compress. To permit cutting it to pattern, stitching, and making any necessary repairs, the material used as covering for a particular compressed bale is the covering removed from a hydraulic, or soft, bale handled a day or two previously. The use of the burlap covering, therefore, is continuous

and progressive, this being the third use, in the following order: (1) As bags containing the seed cotton when carried to the gin; (2) as covering for the soft bale made at the gin; (3) as covering for the compressed, high-density bale.

Two reasons why the bales are opened and made over before compression should be noted. (1) In order that the outgoing bales may be equal to the respective types which they are sold to equal, it is customary to mix measured proportions of cotton from several bales to obtain the desired grade. This mixing, known as the "farfara," is carried on in a large room equipped for the purpose, the mixing being done by hand. For this work numerous Arabs are employed. The "farfara" takes place at the gins and again at the high-density compresses in Alexandria. (2) It is customary to sprinkle the cotton with water about four times during the process of mixing just prior to baling. The content of water thus applied is supposed never to exceed 1 per cent and is said to facilitate compression.

THE PRESS

The type of compress found in Egypt combines and works in conjunction with a baling attachment. The boxes for molding the bale are three in number. They form part of the mechanical construction of the press, and they revolve in a circle. While the box containing a particular bale is being swung into position in the press, the other two boxes are being filled and packed with cotton. Of these two boxes, the one nearest and next in line for compression is in the process of having the cotton foot-packed by five or six Arabs. The Arabs stand in the box and jump up and down as the successive installments of cotton are thrown in. While this box is being foot-packed, the third box receives loose cotton, is filled to the top, and is, therefore, ready for the foot-packing process to begin as soon as it progresses next in line to the press. This type of compress can handle an average of 50 bales per hour, the maximum being about 70 bales.

BALING

A strip of bagging is placed in the bottom of each box and becomes the covering of the bottom (edge side) of the bale. When the foot-packing has been finished and while the box is being mechanically swung into the press, a strip of bagging is laid on the top (top edge) of the bale, falling over on both sides. As the pressure is applied, the height of the bale is reduced to the point where the ends of the burlap meet the bottom piece which was placed in the box. After the 11 bands have been affixed and buttoned and the compression process has been finished, the bale is automatically ejected down an incline to the next floor. Here the burlap ends are neatly sewed on. It requires four Arabs to sew on the ends and keep up with the speed of the compress at the rate of 50 bales per hour. It will have been noted that the burlap covering is in four pieces: one piece covering the bottom edge, one piece covering the top edge and both sides, and one piece covering each end. Any rents or cuts previously made in the bagging have been repaired and well sewed. Upon the completion of the process of compression and of sewing on the ends, or head pieces, the bale is trucked to the scales, where it is weighed, and the weight is marked on the bagging in ink with a hand brush. Following

this, the bale is ship-marked and head-marked with a stencil and is ready for shipment. The dimensions of the finished bale, together with other data related to tare on both the American and the Egyptian bale, are shown in Table 3.

TABLE 3.—*Comparative data relating to tare on American and Egyptian cotton bales*

Item	American high-density compressed bale	Egyptian bale
Gross weight of bale—pounds	[1] 500	[1] 750
Size of bale:		
Height—inches	59	52
Width—do	24	22
Depth—do	19	32
Density per cubic foot—pounds	32.1	35.4
Volume—cubic feet	15.6	21.2
Actual weight of tare—pounds	26.5	22.0
Percentage of tare	5.3	2.9

[1] Approximate gross weight.

CONCLUSIONS

Beneficial results accruing to the Egyptian cotton industry through the successful standardization of the Egyptian bale and its tare are such that it would seem that the American cotton industry might well attempt some similar standardization.

In Egypt the standardization of tare has been realized to such a degree that almost no expense or annoyance of stripping and testing for tare is connected with dealing in Egyptian bales. The necessity for and practice of constantly making and collecting tare claims, requiring so much unnecessary work in the handling of American cotton, is conspicuously absent from the merchandising of the Egyptian crop.

Although the merchandising practices which are peculiar to Egypt have an important influence on the final form of the bale, this fact does not preclude the possibility of adapting some of the methods to American conditions. The well-established reputation for excellence of the Egyptian high-density bale, with its noticeably uniform dimensions, weight, and density, with its complete covering of a closely woven bagging, and with its standardized tare, seems to point to a goal toward which the American cotton industry might well direct more effort.

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